General

Guideline Title

Diagnosis and management of childhood obstructive sleep apnea syndrome.

Bibliographic Source(s)

Marcus CL, Brooks LJ, Draper KA, Gozal D, Halbower AC, Jones J, Schechter MS, Sheldon SH, Spruyt K, Ward SD, Lehmann C, Shiffman RN. Diagnosis and management of childhood obstructive sleep apnea syndrome. Pediatrics. 2012 Sep;130(3):576-84. [17 references] PubMed

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: American Academy of Pediatrics, Subcommittee on Obstructive Sleep Apnea Syndrome, Section on Pediatric Pulmonology. Clinical practice guideline: diagnosis and management of childhood obstructive sleep apnea syndrome. Pediatrics 2002 Apr;109(4):704-12.

All policy statements from the American Academy of Pediatrics automatically expire 5 years after publication unless reaffirmed, revised, or retired at or before that time.

Recommendations

Major Recommendations

Definitions for the quality of the evidence (A-D, X) and the strength of the recommendation (strong recommendation, recommendation, option) are provided at the end of the "Major Recommendations" field.

Key Action Statement 1: Screening for Obstructive Sleep Apnea Syndrome (OSAS)

As part of routine health maintenance visits, clinicians should inquire whether the child or adolescent snores. If the answer is affirmative or if a child or adolescent presents with signs or symptoms of OSAS (see Table below), clinicians should perform a more focused evaluation. (Evidence Quality: Grade B, Recommendation Strength: Recommendation.)

Evidence Profile Key Action Statement 1

- Aggregate evidence quality: B
- Benefit: Early identification of OSAS is desirable, because it is a high-prevalence condition, and identification and treatment can result in alleviation of current symptoms, improved quality of life, prevention of sequelae, education of parents, and decreased health care utilization.

- Harm: Provider time, patient and parent time.
- Benefits-harms assessment: Preponderance of benefit over harm.
- Value judgments: Panelists believe that identification of a serious medical condition outweighs the time expenditure necessary for screening.
- Role of patient preferences: None.
- Exclusions: None.
- Intentional vagueness: None.
- Strength: Recommendation.

Table. Symptoms and Signs of OSAS

History

- Frequent snoring (≥3 nights/week)
- Labored breathing during sleep
- Gasps/snorting noises/observed episodes of apnea
- Sleep enuresis (especially secondary enuresis)[a]
- Sleeping in a seated position or with the neck hyperextended
- Cyanosis
- Headaches on awakening
- Daytime sleepiness
- Attention-deficit/hyperactivity disorder
- Learning problems

Physical Examination

- Underweight or overweight
- Tonsillar hypertrophy
- Adenoidal facies
- Micrognathia/retrognathia
- High-arched palate
- Failure to thrive
- Hypertension

[a]Enuresis after at least 6 months of continence.

Key Action Statement 2A: Polysomnography

If a child or adolescent snores on a regular basis and has any of the complaints or findings shown in the table above, clinicians should either (1) obtain a polysomnogram (Evidence Quality A, Key Action strength: Recommendation) OR (2) refer the patient to a sleep specialist or otolaryngologist for a more extensive evaluation (Evidence quality D, Key Action strength: Option). (Evidence Quality: Grade A for polysomnography; Grade D for specialist referral, Recommendation Strength: Recommendation.)

- Aggregate evidence quality: A
- Benefits: Establish diagnosis and determine severity of OSAS.
- Harm: Expense, time, anxiety/discomfort.
- Benefits-harms assessment: Preponderance of benefit over harm.
- Value judgments: Panelists weighed the value of establishing a diagnosis as more important than the minor potential harms listed.
- Role of patient preferences: Small because of preponderance of evidence that polysomnography is the most accurate way to make a diagnosis.
- Exclusions: See Key Action Statement 2B regarding lack of availability.
- Intentional vagueness: None.
- Strength: Recommendation.

Evidence Profile Key Action Statement 2A: Referral

- Aggregate evidence quality: D
- Benefits: Subspecialist may be better able to establish diagnosis and determine severity of OSAS.
- Harm: Expense, time, anxiety/discomfort.
- Benefits-harms assessment: Preponderance of benefit over harm.
- Value judgments: Panelists weighed the value of establishing a diagnosis as more important than the minor potential harms listed.
- Role of patient preferences: Large.
- Exclusions: None.
- Intentional vagueness: None.
- Strength: Option.

Key Action Statement 2B: Alternative Testing

If polysomnography is not available, then clinicians may order alternative diagnostic tests, such as nocturnal video recording, nocturnal oximetry, daytime nap polysomnography, or ambulatory polysomnography. (Evidence Quality: Grade C, Recommendation Strength: Option.)

Evidence Profile Key Action Statement 2B

- Aggregate evidence quality: C
- Benefit: Varying positive and negative predictive values for establishing diagnosis.
- Harm: False-negative and false-positive results may underestimate or overestimate severity, expense, time, anxiety/discomfort.
- Benefits-harms assessment: Equilibrium of benefits and harms.
- Value judgments: Opinion of the panel that some objective testing is better than none. Pragmatic decision based on current shortage of pediatric polysomnography facilities (this may change over time).
- Role of patient preferences: Small, if choices are limited by availability; families may choose to travel to centers where more extensive facilities are available.
- Exclusions: None.
- Intentional vagueness: None.
- Strength: Option.

Key Action Statement 3: Adenotonsillectomy

If a child is determined to have OSAS, has a clinical examination consistent with adenotonsillar hypertrophy, and does not have a contraindication to surgery (see the "Contraindications" field), the clinician should recommend adenotonsillectomy as the first line of treatment. If the child has OSAS but does not have adenotonsillar hypertrophy, other treatment should be considered (see Key Action Statement 6). Clinical judgment is required to determine the benefits of adenotonsillectomy compared with other treatments in obese children with varying degrees of adenotonsillar hypertrophy. (Evidence Quality: Grade B, Recommendation Strength: Recommendation.)

Evidence Profile Key Action Statement 3

- Aggregate evidence quality: B
- Benefit: Improve OSAS and accompanying symptoms and sequelae.
- Harm: Pain, anxiety, dehydration, anesthetic complications, hemorrhage, infection, postoperative respiratory difficulties, velopharyngeal incompetence, nasopharyngeal stenosis, death.
- Benefits-harms assessment: Preponderance of benefit over harm.
- Value judgments: The panel sees the benefits of treating OSAS as more beneficial than the low risk of serious consequences.
- Role of patient preferences: Low; continuous positive airway pressure (CPAP) is an option but involves prolonged, long-term treatment as compared with a single, relatively low-risk surgical procedure.
- Exclusions: See the "Contraindications" field.
- Intentional vagueness: None.
- Strength: Recommendation.

Key Action Statement 4: High-Risk Patients Undergoing Adenotonsillectomy

Clinicians should monitor high-risk patients (see the "Potential Harms" field) undergoing adenotonsillectomy as inpatients postoperatively. (Evidence Quality: Grade B, Recommendation Strength: Recommendation.)

Evidence Profile Key Action Statement 4

- Aggregate evidence quality: B
- Benefit: Effectively manage severe respiratory compromise and avoid death.
- Harm: Expense, time, anxiety.
- Benefits-harms assessment: Preponderance of benefit over harm.
- Value judgments: The panel believes that early recognition of any serious adverse events is critically important.
- Role of patient preferences: Minimal; this is an important safety issue.
- Exclusions: None.
- Intentional vagueness: None.
- Strength: Recommendation.

Key Action Statement 5A: Reevaluation

Clinicians should clinically reassess all patients with OSAS for persisting signs and symptoms after therapy to determine whether further treatment is required. (Evidence Quality: Grade B, Recommendation Strength: Recommendation.

Evidence Profile Key Action Statement 5A

- Aggregate evidence quality: B
- Benefit: Determine effects of treatment.
- Harm: Expense, time.
- Benefits-harms assessment: Preponderance of benefit over harm.
- Value judgments: Data show that a significant proportion of children continue to have abnormalities postoperatively; therefore, the panel determined that the benefits of follow-up outweigh the minor inconveniences.
- Role of patient preferences: Minimal; follow-up is good clinical practice.
- Exclusions: None.
- Intentional vagueness: None.
- Strength: Recommendation.

Key Action Statement 5B: Reevaluation of High-Risk Patients

Clinicians should reevaluate high-risk patients for persistent OSAS after adenotonsillectomy, including those who had a significantly abnormal baseline polysomnogram, have sequelae of OSAS, are obese, or remain symptomatic after treatment, with an objective test (see Key Action Statement 2) or refer such patients to a sleep specialist. (Evidence Quality: Grade B, Recommendation Strength: Recommendation.)

Evidence Profile Key Action Statement 5B

- Aggregate evidence quality: B
- Benefit: Determine effects of treatment.
- Harm: Expense, time, anxiety/discomfort.
- Benefits-harms assessment: Preponderance of benefit over harm.
- Value judgments: Given the panel's concerns about the consequences of OSAS and the frequency of postoperative persistence in high-risk groups, the panel believes that the follow-up costs are outweighed by benefits of recognition of persistent OSAS. A minority of panelists believed that all children with OSAS should have follow-up polysomnography because of the high prevalence of persistent postoperative abnormalities on polysomnography, but most panelists believed that persistent polysomnographic abnormalities in uncomplicated children with mild OSAS were usually mild in patients who were asymptomatic after surgery.
- Role of patient preferences: Minimal. Further evaluation is needed to determine the need for further treatment.
- Exclusions: None.
- Intentional vagueness: None.
- Strength: Recommendation.

Key Action Statement 6: CPAP

Clinicians should refer patients for CPAP management if symptoms/signs (see table above) or objective evidence of OSAS persists after adenotonsillectomy or if adenotonsillectomy is not performed. (Evidence Quality: Grade B, Recommendation Strength: Recommendation.)

Evidence Profile Key Action Statement 6

- Aggregate evidence quality: B
- Benefit: Improve OSAS and accompanying symptoms and sequelae.
- Harm: Expense, time, anxiety; parental sleep disruption; nasal and skin adverse effects; possible midface remodeling; extremely rare serious pressure-related complications, such as pneumothorax; poor adherence.
- Benefits-harms assessment: Preponderance of benefit over harm.
- Value judgments: Panelists believe that CPAP is the most effective treatment of OSAS that persists postoperatively and that the benefits of treatment outweigh the adverse effects. Other treatments (e.g., rapid maxillary expansion) may be effective in specially selected patients.
- Role of patient preferences: Other treatments may be effective in specially selected patients.
- Exclusions: Rare patients at increased risk of severe pressure complications.
- Intentional vagueness: None.
- Policy level: Recommendation.

Key Action Statement 7: Weight Loss

Clinicians should recommend weight loss in addition to other therapy if a child/adolescent with OSAS is overweight or obese. (Evidence Quality: Grade C, Recommendation Strength: Recommendation.)

Evidence Profile Key Action Statement 7

- Aggregate evidence quality: C
- Benefit: Improve OSAS and accompanying symptoms and sequelae; non–OSAS-related benefits of weight loss.
- Harm: Hard to achieve and maintain weight loss.
- Benefits-harms assessment: Preponderance of benefit over harm.
- Value judgments: The panel agreed that weight loss is beneficial for both OSAS and other health issues, but clinical experience suggests that weight loss is difficult to achieve and maintain, and even effective weight loss regimens take time; therefore, additional treatment is required in the interim.
- Role of patient preferences: Strong role for patient and family preference regarding nutrition and exercise.
- Exclusions: None.
- Intentional vagueness: None.
- Strength: Recommendation.

Key Action Statement 8: Intranasal Corticosteroids

Clinicians may prescribe topical intranasal corticosteroids for children with mild OSAS in whom adenotonsillectomy is contraindicated or for children with mild postoperative OSAS. (Evidence Quality: Grade B, Recommendation Strength: Option.)

Evidence Profile Key Action Statement 8

- Aggregate evidence quality: B
- Benefit: Improves mild OSAS and accompanying symptoms and sequelae.
- Harm: Some subjects may not have an adequate response. It is not known whether therapeutic effect persists long-term; therefore, long-term observation is required. Low risk of steroid-related adverse effects.
- Benefits-harms assessment: Preponderance of benefit over harm.
- Value judgments: The panel agreed that intranasal steroids provide a less invasive treatment than surgery or CPAP and, therefore, may be preferred in some cases despite lower efficacy and lack of data on long-term efficacy.
- Role of patient preferences: Moderate role for patient and family preference if OSAS is mild.
- Exclusions: None.
- Intentional vagueness: None.
- Strength: Option.

Definitions:

Evidence Quality

Evidence Quality	Preponderance of Benefit or Harm	Balance of Benefit and Harm
A. Well-designed randomized controlled trials (RCTs) or diagnostic studies on relevant	Strong recommendation	Option

Evidence Quality	Preponderance of Benefit or Harm	Balance of Benefit and Harm
B. RCTs or diagnostic studies with minor limitations; overwhelmingly consistent evidence from observational studies	Recommendation/Strong Recommendation	Option
C. Observational studies (case-control and cohort design)	Recommendation	Option
D. Expert opinion, case reports, reasoning from first principles	Option	No Recommendation
X. Exceptional situations where validating studies cannot be performed and there is a clear preponderance of benefit or harm	Recommendation/Strong Recommendation	
Integrating evidence quality appraisal with an assessment of the anticipated balance between benefits and harms if a policy is carried out leads to designation of a policy as a strong recommendation, recommendation, option, or no recommendation.		

Definitions and Recommendation Implications

Statement	Definition	Implication
Strong recommendation	A strong recommendation in favor or a particular action is made when the anticipated benefits of the recommended intervention clearly exceed the harms (as a strong recommendation against an action is made when the anticipated harms clearly exceed the benefits) and the quality of the supporting evidence is excellent. In some clearly identified circumstances, strong recommendations may be made when high-quality evidence is impossible to obtain and the anticipated benefits strongly outweigh the harms.	Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present.
Recommendation	A recommendation in favor of a particular action is made when the anticipated benefits exceed the harms but the quality of evidence is not as strong. Again, in some clearly identified circumstances, recommendations may be made when high-quality evidence is impossible to obtain but the anticipated benefits outweigh the harms.	It would be prudent for clinicians to follow a recommendation, but they should remain alert to new information and sensitive to patient preferences.
Option	Options define courses that may be taken when either the quality of evidence is suspect or carefully performed studies have shown little clear advantage to one approach over another.	Clinicians should consider the option in their decision-making, and patient preferences may have a substantial role.
No recommendation	No recommendation indicates that there is a lack of pertinent published evidence and that the anticipated balance of benefits and harms is presently unclear.	Clinicians should be alert to new published evidence that clarifies the balance of benefit versus harm.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Disease/Condition(s)

Obstructive sleep apnea syndrome (OSAS)

Guideline Category

Diagnosis

Evaluation

Management

Risk Assessment

Screening

Treatment

Clinical Specialty

Family Practice

Otolaryngology

Pediatrics

Pulmonary Medicine

Sleep Medicine

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Nurses

Physician Assistants

Physicians

Guideline Objective(s)

- To increase the recognition of obstructive sleep apnea syndrome (OSAS) by primary care clinicians to minimize delay in diagnosis and to avoid serious sequelae of OSAS
- To evaluate diagnostic techniques
- To describe treatment options
- To provide guidelines for follow-up
- To discuss areas requiring further research

Target Population

Otherwise healthy children older than 1 year of age with uncomplicated obstructive sleep apnea syndrome (OSAS), such as OSAS associated with adenotonsillar hypertrophy and/or obesity, who are being treated in the primary care setting

Note: The guidelines specifically exclude the following: infants younger than 1 year, patients with central apnea or hypoventilation syndromes,

patients with OSAS associated with other medical disorders, including but not limited to Down syndrome, craniofacial anomalies, neuromuscular disease (including cerebral palsy), chronic lung disease, sickle cell disease, metabolic disease, or laryngomalacia.

Interventions and Practices Considered

Diagnosis/Evaluation/Screening

1. Screening for snoring and other signs and symptoms of obstructive sleep apnea syndrome (OSAS)
2. History and physical examinations
3. Polysomnography
4. Alternative diagnostic tests
    - Nocturnal video recording
    - Nocturnal oximetry
    - Daytime nap polysomnography
    - Ambulatory polysomnography

Management/Treatment

1. Referral to a sleep specialist or otolaryngologist for a more extensive evaluation
2. Adenotonsillectomy
3. Monitoring high-risk patients undergoing adenotonsillectomy as inpatients postoperatively
4. Postoperative evaluation and monitoring, including objective testing of high-risk patients
5. Continuous positive airway pressure (CPAP) with monitoring for adherence
6. Weight loss (in addition to other therapies if patient is overweight or obese)
7. Topical intranasal corticosteroids

Major Outcomes Considered

- Prevalence of obstructive sleep apnea syndrome (OSAS) and primary snoring
- Sequelae of OSAS (e.g., cardiovascular, growth, and neurobehavioral abnormalities, and possibly inflammation)
- Reliability of diagnostic screening tests (positive/negative predictive values, sensitivity, specificity of tests)
- Symptoms of OSAS (e.g., snoring, apnea hypopnea index)
- Adverse effects or complications of treatment of OSAS

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search

A literature search was performed that included English-language articles, children and adolescents aged 1 through 17.9 years, and publication between 1999 and 2008. Animal studies, abstracts, letters, case reports, and reviews were excluded. The Medical Subject Heading terms that were used in all fields were snoring, apnea, sleep-disordered breathing (SDB), sleep-related breathing disorders, upper airway resistance, polysomnography (PSG), sleep study, adenoidectomy, tonsillectomy, continuous positive airway pressure (CPAP), obesity, adiposity, hypopnea, hypoventilation, cognition, behavior, and neuropsychology. Search engines used were PubMed, Scopus, Ovid, PsycINFO, EBSCO (including Health Source [Nursing], Child Development and Adolescent Studies), and CINAHL. Articles covering special populations (e.g., infants aged <1 year, those with craniofacial anomalies or syndromes) were excluded during the title and abstract reviews.

Titles and available abstracts of articles found by the literature search were reviewed by the committee members in several rounds. In the first round, duplicates and erroneous hits from the literature search were excluded. In the second round, titles were reviewed for relevancy by 2 committee members. Articles with relevant titles were then reviewed by 2 reviewers each, on the basis of the abstract. Because of the large number of remaining articles, text-mining (Statistica, StatSoft version 9; StatSoft, Inc, Tulsa, OK) was performed on the method section of the articles to reduce the large amount of articles for the final step of quality assessment. Text-mining is the combined, automated process of analyzing unstructured, natural language text to discover information and knowledge that are typically difficult to retrieve.

Unfortunately, text-mining revealed that few articles reported research methods, such as the study design (e.g., clinical case series, retrospective, observational, clinical experiment), blinding of the assessment, and recruitment and/or scoring, that could have been applied for further selection. A manual screening of the questionable articles after text-mining resulted in a pool of 605 articles. The committee decided on a final round of title selection; that is, each member was assigned a random batch of articles and selected titles based on relevance with respect to the guideline categories. These remaining articles were each reviewed and graded by a committee member. Because of the large volume of articles requiring detailed evaluation, some committee members recruited trainees and colleagues to assist them in the performance of these reviews, under their supervision. A literature search of more recent articles (2008–2011) was performed by individual committee members, per guideline category, and discussed during the committee meeting.

Number of Source Documents

The automated Medical Subject Heading search resulted in 3166 hits. The final round of title selection resulted in 397 articles for detailed review. An additional 47 articles were found to not meet criteria during the detailed review. Thus, a total of 350 articles were included. On the basis of the final 350 articles, one-third were epidemiologic studies, 26% were diagnostic studies, and 23% were treatment studies.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Evidence Grading System for the Assessment of Clinical Utility of Diagnostic Tests*

Level	Description
I	Evidence provided by a prospective study in a broad spectrum of persons who have the suspected condition, by using a reference (gold) standard for case definition, in which the test is applied in a blinded fashion, and enabling the assessment of appropriate test of diagnostic accuracy. All persons undergoing the diagnostic test have the presence or absence of the disease determined. Level I studies are judged to have a low risk of bias.
II	Evidence provided by a prospective study of a narrow spectrum of persons who have the suspected condition, or a well-designed retrospective study of a broad spectrum of persons who have an established condition (by gold standard) compared with a broad spectrum of controls, in which the test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy. Level II studies are judged to have a moderate risk of bias.
III	Evidence provided by a retrospective study in which either persons who have the established condition or controls are of a narrow spectrum, and in which the reference standard, if not objective, is applied by someone other than the person who performed (interpreted) the test. Level III studies are judged to have a moderate to high risk of bias.
IV	Any study design where the test is not applied in an independent evaluation or evidence is provided by expert opinion alone or in descriptive case series without controls. There is no blinding or there may be inadequate blinding. The spectrum of persons tested may be broad or narrow. Level IV studies are judged to have a very high risk of bias.

*Adapted from the American Academy of Neurology.

Evidence Quality

Evidence Quality	Preponderance of Benefit or Harm	Balance of Benefit and Harm
A. Well-designed randomized controlled trials (RCTs) or diagnostic studies on relevant population	Strong recommendation	Option
B. RCTs or diagnostic studies with minor limitations; overwhelmingly consistent evidence from observational studies	Recommendation/Strong Recommendation	Option
C. Observational studies (case-control and cohort design)	Recommendation	Option
D. Expert opinion, case reports, reasoning from first principles	Option	No Recommendation
X. Exceptional situations where validating studies cannot be performed and there is a clear preponderance of benefit or harm	Recommendation/Strong Recommendation	
Integrating evidence quality appraisal with an assessment of the anticipated balance between benefits and harms if a policy is carried out leads to designation of a policy as a strong recommendation, recommendation, option, or no recommendation.		

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Quality Assessment

The previous literature review form was modified to include the evidence grading system developed by the American Academy of Neurology for the assessment of clinical utility of diagnostic tests (see the "Rating Scheme for the Strength of the Evidence" field). A specific customized software (OSA Taskforce; copyright Francesco Rundo and Karen Spruyt) was developed for the literature review form to standardize this part of the process. Of note, the quality assessment levels were comparable to the grading levels applied previously. The quality assessment applied involved 4 tiers of evidence, with level I studies being judged to have a low risk of bias and level IV studies judged to have a very high level of bias. A weaker level of evidence indicates the need to integrate greater clinical judgment when applying results to clinical decision-making. The committee's quality assessment of data took into account not only the levels of evidence in relevant articles but also the number of articles identified, the magnitude and direction of various findings, and whether articles demonstrated convergent or divergent conclusions.

The evidence-based approach to guideline development requires that the evidence in support of each key action statement be identified, appraised, and summarized and that an explicit link between evidence and recommendations be defined. Evidence-based recommendations reflect the quality of evidence and the balance of benefit and harm that is anticipated when the recommendation is followed. The American Academy of Pediatrics' policy statement "Classifying Recommendations for Clinical Practice Guidelines" was followed in designating levels of recommendations (see the "Rating Scheme for the Strength of the Evidence" and "Rating Scheme for the Strength of the Recommendations" field).

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The American Academy of Pediatrics (AAP) selected a subcommittee composed of pediatricians and other experts in the fields of sleep medicine, pulmonology, and otolaryngology, as well as experts from epidemiology and pediatric practice to develop an evidence base of literature on this topic. The committee included liaison members from the AAP Section on Otolaryngology-Head and Neck Surgery, American Thoracic Society, American Academy of Sleep Medicine, American College of Chest Physicians, and the National Sleep Foundation.

For initial guideline drafts, committee members were assigned sections of the report that were not directly in their area of research, and the evidence, search results, and conclusions thereof were discussed by all committee members at a face-to-face meeting. Subsequent drafts of the guidelines and technical report were reviewed by all committee members.

Rating Scheme for the Strength of the Recommendations

Definitions and Recommendation Implications

Statement	Definition	Implication
Strong recommendation	A strong recommendation in favor or a particular action is made when the anticipated benefits of the recommended intervention clearly exceed the harms (as a strong recommendation against an action is made when the anticipated harms clearly exceed the benefits) and the quality of the supporting evidence is excellent. In some clearly identified circumstances, strong recommendations may be made when high-quality evidence is impossible to obtain and the anticipated benefits strongly outweigh the harms.	Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present.
Recommendation	A recommendation in favor of a particular action is made when the anticipated benefits exceed the harms but the quality of evidence is not as strong. Again, in some clearly identified circumstances, recommendations may be made when high-quality evidence is impossible to obtain but the anticipated benefits outweigh the harms.	It would be prudent for clinicians to follow a recommendation, but they should remain alert to new information and sensitive to patient preferences.
Option	Options define courses that may be taken when either the quality of evidence is suspect or carefully performed studies have shown little clear advantage to one approach over another.	Clinicians should consider the option in their decision-making, and patient preferences may have a substantial role.
No recommendation	No recommendation indicates that there is a lack of pertinent published evidence and that the anticipated balance of benefits and harms is presently unclear.	Clinicians should be alert to new published evidence that clarifies the balance of benefit versus harm.

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Not stated

Description of Method of Guideline Validation

Not applicable

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is specifically stated for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Accurate diagnosis of obstructive sleep apnea syndrome (OSAS) and improvement in accompanying symptoms and sequelae of OSAS

For benefits of specific interventions considered in the guideline, see the "Major Recommendations" field.

Potential Harms

Continuous Positive Airway Pressure (CPAP)

Harms include expense, time, anxiety, parental sleep disruption, nasal and skin adverse effects, possible midface remodeling, and extremely rare serious pressure-related complications, such as pneumothorax; poor adherence.

Adenotonsillectomy

Although serious complications (including death) may occur in obese children, the rate of these complications is low, and the risks of complications need to be weighed against the consequences of untreated obstructive sleep apnea syndrome (OSAS). Other treatment options, such as anti-inflammatory medications, weight loss, or tracheostomy, are less effective, are difficult to achieve, or have higher morbidity, respectively.

Risks of Adenotonsillectomy

- Minor
  - Pain
  - Dehydration attributable to postoperative nausea/vomiting and poor oral intake
- Major
  - Anesthetic complications
  - Acute upper airway obstruction during induction or emergence from anesthesia
  - Postoperative respiratory compromise
  - Hemorrhage
  - Velopharyngeal incompetence
  - Nasopharyngeal stenosis
  - Death

High-Risk Patients Undergoing Adenotonsillectomy

Patients with OSAS may develop respiratory complications, such as worsening of OSAS or pulmonary edema, in the immediate postoperative period. Death attributable to respiratory complications in the immediate postoperative period has been reported in patients with severe OSAS. High-risk patients should undergo surgery in a center capable of treating complex pediatric patients. They should be hospitalized overnight for close monitoring postoperatively. Children with an acute respiratory infection on the day of surgery, as documented by fever, cough, and/or wheezing, are at increased risk of postoperative complications and, therefore, should be rescheduled or monitored closely postoperatively. Clinicians should decide on an individual basis whether these patients should be rescheduled, taking into consideration the severity of OSAS in the particular patient and keeping in mind that many children with adenotonsillar hypertrophy have chronic rhinorrhea and nasal congestion, even in the absence of viral infections.

Risk Factors for Postoperative Respiratory Complications in Children with OSAS Undergoing Adenotonsillectomy

- Younger than 3 y of age
- Severe OSAS on polysomnography[a]
- Cardiac complications of OSAS

- Failure to thrive
- Obesity
- Craniofacial anomalies[b]
- Neuromuscular disorders[b]
- Current respiratory infection

[a]It is difficult to provide exact polysomnographic criteria for severity, because these criteria will vary depending on the age of the child; additional comorbidities, such as obesity, asthma, or cardiac complications of OSAS; and other polysomnographic criteria that have not been evaluated in the literature, such as the level of hypercapnia and the frequency of desaturation (as compared with lowest oxygen saturation). Nevertheless, on the basis of published studies, it is recommended that all patients with a lowest oxygen saturation <80% (either on preoperative polysomnography or during observation in the recovery room postoperatively) or an apnea hypopnea index ≥24/h be observed as inpatients postoperatively as they are at increased risk for postoperative respiratory compromise. Additionally, on the basis of expert consensus, it is recommended that patients with significant hypercapnia on polysomnography (peak PCO_2 ≥60 mm Hg) be admitted postoperatively. The committee noted that that most published studies were retrospective and not comprehensive, and therefore these recommendations may change if higher-level studies are published. Clinicians may decide to admit patients with less severe polysomnographic abnormalities based on a constellation of risk factors (age, comorbidities, and additional polysomnographic factors) for a particular individual.

[b]Not discussed in these guidelines.

Intranasal Corticosteroids

Because the long-term effect of this treatment is unknown, the clinician should continue to observe the patient for symptoms of recurrence and adverse effects of corticosteroids.

For additional harms of specific interventions considered in the guideline, see the "Major Recommendations" field.

Contraindications

Contraindications

Contraindications for Adenotonsillectomy

- Absolute contraindications
  - No adenotonsillar tissue (tissue has been surgically removed)
- Relative contraindications
  - Very small tonsils/adenoid
  - Morbid obesity and small tonsils/adenoid
  - Bleeding disorder refractory to treatment
  - Submucus cleft palate
  - Other medical conditions making patient medically unstable for surgery

Qualifying Statements

Qualifying Statements

The recommendations in this report do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Marcus CL, Brooks LJ, Draper KA, Gozal D, Halbower AC, Jones J, Schechter MS, Sheldon SH, Spruyt K, Ward SD, Lehmann C, Shiffman RN. Diagnosis and management of childhood obstructive sleep apnea syndrome. Pediatrics. 2012 Sep;130(3):576-84. [17 references] PubMed

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2002 Apr (revised 2012 Sep)

Guideline Developer(s)

American Academy of Pediatrics - Medical Specialty Society

Source(s) of Funding

The American Academy of Pediatrics has neither solicited nor accepted any commercial involvement in the development of the content of this publication.

Guideline Committee

Subcommittee on Obstructive Sleep Apnea Syndrome

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

All authors have filed conflict of interest statements with the American Academy of Pediatrics. Any conflicts have been resolved through a process approved by the Board of Directors.

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- Karen Spruyt, PhD (clinical psychologist, child neuropsychologist, and biostatistician/epidemiologist; no conflicts; affiliated with an academic sleep center)

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: American Academy of Pediatrics, Subcommittee on Obstructive Sleep Apnea Syndrome, Section on Pediatric Pulmonology. Clinical practice guideline: diagnosis and management of childhood obstructive sleep apnea syndrome. Pediatrics 2002 Apr;109(4):704-12.

All policy statements from the American Academy of Pediatrics automatically expire 5 years after publication unless reaffirmed, revised, or retired at or before that time.

Guideline Availability

Electronic copies: Available from the American Academy of Pediatrics (AAP) Policy Web site .

Print copies: Available from American Academy of Pediatrics, 141 Northwest Point Blvd., P.O. Box 927, Elk Grove Village, IL 60009-0927.

Availability of Companion Documents

The following is available:

- Technical Report: diagnosis and management of childhood obstructive sleep apnea syndrome. Pediatrics 2012 Sep;130(3):e714-e755. Electronic copies: Available from the American Academy of Pediatrics (AAP) Policy Web site .

Print copies: Available from American Academy of Pediatrics, 141 Northwest Point Blvd., P.O. Box 927, Elk Grove Village, IL 60009-0927.

Patient Resources

None available

NGC Status

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